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ABSTRACT

This third in a series of eight modules for a course titled Quality Assurance Practices describes the typical receiving responsibilities for inventory control and inspection. Attributes typically inspected are listed, inspection practices are described, and typical records are illustrated. In addition, handling precautions are described as they apply to receiving inspection. The module follows a typical format that includes the following sections: (1) introduction, (2) module prerequisites, (3) objectives, (4) notes to instructor/student, (5) subject matter, (6) materials needed, (7) procedures, (8) data table, (9) reference materials, (10) test. (The course is one of fifteen technical courses for the second year of a two-year postsecondary curriculum in Nuclear Quality Assurance/Quality Control Technology.) (LRA)

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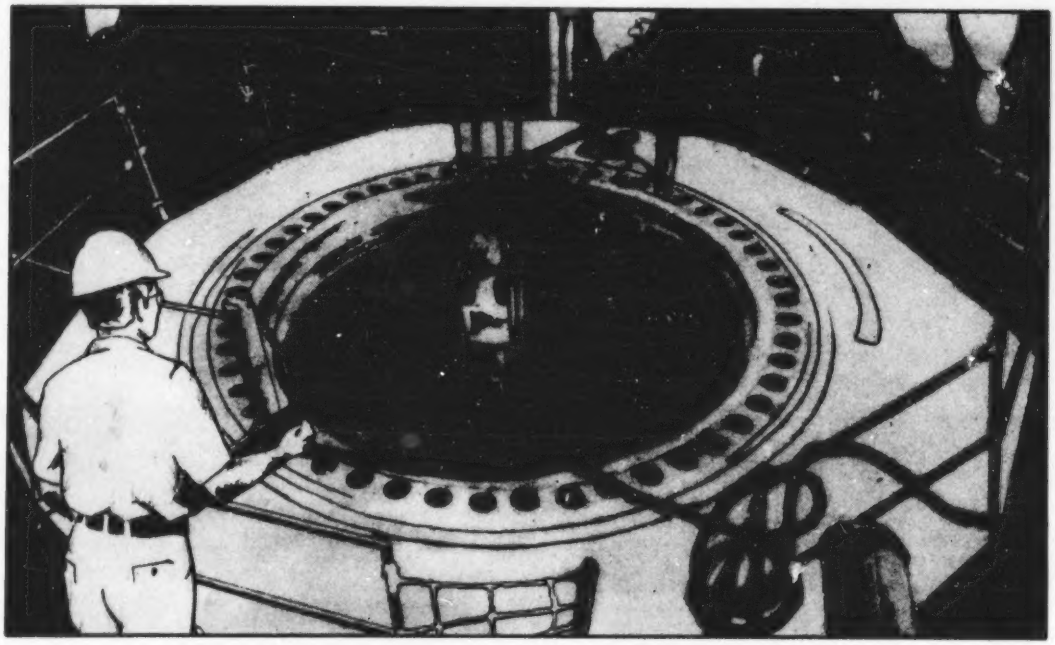
NUCLEAR TECHNOLOGY

COURSE 31 QUALITY ASSURANCE PRACTICES

MODULE 31-3 Receiving Inspection



CE 024 287

GENERAL PHYSICS CORPORATION
Columbia , Maryland

COURSE MODULES

COURSE 31 QUALITY ASSURANCE PRACTICES

Module 31-1	Overall Quality Assurance Program
Module 31-2	Vendor Qualification
Module 31-3	Receiving Inspection
Module 31-4	Identification, Storage and Handling of Components, Parts and Materials
Module 31-5	Non-Conforming Materials
Module 31-6	Certification and Qualification of Quality Control Inspectors
Module 31-7	Auditing for Quality Assurance
Module 31-8	Document Handling, Storage and Retrieval for Quality Assurance

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This module was prepared for General Physics Corporation by Ed Wasil and John Espy, General Physics Corporation.

GENERAL PHYSICS CORPORATION

1979

INTRODUCTION

The Nuclear QA/QC Technician can be assigned as a receiving inspector responsible for inspecting items as they are received. Later in his or her career, the technician may be responsible for preparing receiving inspection instructions which specify exactly what will be inspected. These responsibilities are extremely important because they result in determination of acceptance of received items. Payment of suppliers by the purchaser is predicated upon such determination.

Receiving activities are typically comprized of two organizations. One is responsible for inventory control and the other is responsible for inspection. This module describes this typical arrangement. The responsibilities of both groups are described with respect to inspection of received items. Attributes typically inspected are listed, inspection practices are described, and typical records are illustrated. In addition, handling precautions are described as they apply to receiving inspection.

MODULE PREREQUISITES

The two previous modules, 31-1 and 31-2 should have been completed before proceeding to this one.

OBJECTIVES

Upon completion of this module, the student/trainee can:

1. Name three functions typically accomplished by the receiving activity.
2. Describe the relative responsibilities for the receiving activity of Material Services Department, Quality Assurance Department, and Quality Control Department.
3. Describe inspection for shipping damage including typical attributes associated with this inspection.
4. Describe inspection for item identity including typical attributes associated with this inspection.
5. Name two types of paperwork which may accompany received items and which attests to the quality of the items; briefly describe the general content of each.
6. Describe inspection for item function including typical attributes associated with this inspection.
7. Name three levels of receiving inspection and briefly describe each.
8. Describe the uses of the following records:
   a. QC Receiving Inspection Report
   b. Conformance Tag
   c. Nonconformance Tag
9. Inspect sample product in a simulated receiving activity.

NOTES TO INSTRUCTOR / STUDENT

One of the Procedures included in this module recommends performance of receiving inspection of a packaged item. Items which can be used for this procedure may be incoming

items at your facility. Where possible, a copy of the purchase order for such items should be obtained and used during the inspection. In fact, many facilities insist that the purchase order (purchase requisition) be used during the inspection.

THE RECEIVING ACTIVITY

Functions

Each purchaser of goods establishes a receiving activity to handle purchased items upon their receipt. Such receiving activities require planning to ensure that all necessary functions are accomplished for the complete range of items expected to be received. At the nuclear power plant construction site, a wide variety of materials, components, and equipment are received. The utility, prime construction contractor, and construction subcontractors may all have receiving activities accomplish similar functions.

Receiving activities are typically structured to accomplish three functions. First, it provides a basis for payment to the supplier for the received items. Results of receiving typically serve as the initiating cue to the purchasing department for payment to the supplier. Secondly, it provides evidence that received items are available for use. Work activities which require the received items are scheduled upon notice of receipt and acceptance. Thirdly, it determines the acceptability of received items. Both the purchasing department and the activity which uses the items must know that the items are acceptable.

Organization

Receiving functions are typically assigned to a department other than Quality Control (QC) except that QC may retain certain responsibilities for exercising acceptance decisions. While departmental titles vary among companies, the department assigned responsibility for receiving is considered the Material Services Department herein. Material Services is a support organization responsible for receiving of items, and storage of items not immediately needed by other

departments. Where advance planning has identified what items will be needed and the schedule for their use, Material Services may also initiate procurement of the items. For example, Material Services for the Operations Phase may be responsible for controlling repair part inventory such that as items reach minimum stock inventory level, purchases are made to increase inventory. Finally, Material Services may perform certain inspections of received items.

The Quality Assurance Department (QA) is typically responsible for ensuring that Materials Services uses documented procedures which comply with the quality assurance program. In this regard, QA ensures that acceptable practices are used for receipt, handling, storage, and issue of received items. QA also typically designates the extent of inspection to be performed as an integral part of receiving.

The Quality Control Department (QC) performs receiving inspection consistent with assigned responsibility. For items subject to QC inspection, QC establishes and implements inspection procedures using trained inspectors.

Facilities

The receiving activity requires facilities for the receipt, handling, storage, and issue of items. Items are initially received at truck and/or train off-loading docks and initial lay-down areas. Lifting equipment can include fork-lift trucks, other types of mobile equipment, chain falls, cranes, hoists, elevators, and associated cables, hooks, clamps, and beams. Initial lay-down areas are typically paved or provided with timbers to keep received items off the ground. Such areas are designed to avoid standing water. Items to be stored outside are offloaded at their outside storage area if possible. Items are moved to inside storage, or if necessary, to outside storage by equipment designed for the purpose. Fork lift trucks are

typically used for smaller items and cranes or "cherry pickers" are typically used for larger items. Storage facilities are designed to provide necessary protection which is dependent upon the susceptability of the item to deterioration in storage. Such facilities can range from outside skids to enclosed, environmentally controlled rooms. Equipment used to transport items from storage to their point of use is typically the same or similar to the equipment which placed the items into storage.

Levels of Packaging

Items are packaged by suppliers to afford protection in transit. The extent of packaging is specified by the purchaser, typically by referencing a national standard which describes packaging levels. The purchaser also requires suppliers to identify any special storage requirements which are necessary to prevent or minimize deterioration in storage. Generally, packaging and storage requirements are similar except that packaging must also prevent damage from movement of items in transit.

Four levels of requirements for packaging nuclear components are defined: Level A, B, C, and D. Each level prescribes packaging requirements that protect the component during shipping, handling and storage. The specific level applied is dependent on the conditions demanded of the component by the system that uses the component. This means that the level of packaging that is selected must protect and preserve those features of the component that exist to meet the requirements that are demanded of the component by the plant system. Examples of such requirements include cleanliness, freedom from oxidation, freedom from nicks and gouges, protection of weld preparation dimensions, and protection of electrical circuits.

Components classified as needing Level A packaging are those that require extraordinary environmental protection. Level A packaging affords protection from (1) shock and vibration, (2) temperature and humidity extremes, and (3) foreign materials such as dirt, sand, oil, water, etc.

Components classified as needing Level B packaging are those that are sensitive to environmental conditions but not to the extreme as Level A. The packaging for Level B components requires the same degree of protection as Level A except control of temperature and humidity extremes is not required.

Level C components require protection from the environment and airborne containments but not from water vapor and condensation to the degree which is applicable for Level A and Level B components.

The lowest level of packaging requirements is Level D. Level D components are the least sensitive to environmental conditions. Protection against weather conditions and physical damage is required for Level D components.

The component supplier performs final inspections prior to packaging to insure the component is ready for packaging. These inspections determine cleanliness; freedom from entrapped water, dirt, residue, metal chips, and any other form of contamination; proper assembly; and correct dimensions. The component is then packaged to meet the specified level of protection. Types of packaging are summarized as follows:

- Protection from temperature and humidity extremes - The primary purpose of this protection is to prevent condensation from collecting on the component. Protection from condensation is afforded by vapor proof barriers or by capping all openings of the components. Dessicants (moisture absorbing agents) may also be placed inside the barrier. Vapor barrier

material is sealable. The section of the barrier which can be opened for access to the component must be large enough to permit at least two subsequent sealing operations.

- Protection from weather and foreign materials - The component is wrapped with a second barrier to protect it from salt, dust, and other forms of contamination. Each barrier is a flexible material designed to withstand the penetration of water, water vapor, grease, etc. Barriers are constructed of materials which are not easily damaged by puncture, abrasion, weathering, cracking due to temperature extremes, and wind conditions. When used for stainless steel components, the barrier material must not contain halogens (any of the five elements: fluorine, chlorine, bromine, iodine, and astatine). Halogens can cause stress corrosion cracking in stainless steels. Also, barrier material must not be corrosive and must not readily support combustion. Component openings are capped, plugged, or sealed. Weld end preparations are also protected against physical damage. For Level A components, these protective devices are needed in addition to the flexible barriers. For other levels, these devices may substitute for the flexible barrier. Caps and plugs are colored differently than the component so that they can be easily located if they are pushed into the component. An exception to this rule is the use of clear, plastic closures as a window for humidity indicator cards. Metallic caps and plugs are made of a material compatible with the component in order to avoid galvanic corrosion. Gasketing or other nonmetallic materials used for sealing must not have a corrosive effect on the component.

- Protection from shock and vibration - Components may be placed into containers or blocked on open skids. They are anchored, braced and cushioned to prevent motion of the component independent of the container or skid.

RECEIVING INSPECTION ATTRIBUTES

Types

Several types of attributes are subject to receiving inspection. The specific attributes for given items can generally be grouped by three types. These are attributes pertaining to (1) shipping damage, (2) identity and quantity, and (3) function. Receiving inspection typically addresses at least the first two types as a minimum.

Inspection Attributes for Shipping Damage

Items are shipped by a variety of modes. Truck, rail, air, and barge transportation are all used dependent on the item. Damage can occur in transit from shock, vibration, mishandling, and from environmental conditions. One objective of receiving inspection is to determine if damage has occurred to items received.

The condition of packaging is indicative of the condition of received items although not exclusively so. Accordingly, the condition of packaging is examined for evidence of damage. If packaging is damaged, the item may or may not be damaged. But, if packaging is damaged, detailed examination of the item is in order.

Packaging is considered in two broad categories: open and boxed. Open packaging consists of tie-downs between the item and skids, pallets, or the beds of trucks, railcars, or barges. Braces, pads, plugs, and other protective devices

are used as necessary. Attributes of open packaging which are of concern include loose tie-downs, missing pads and plugs, bent ties and braces, and evidence of shifting between the item and its supports. With respect to boxed or crated items, attributes of concern include crushed or torn areas, splintered or broken crating, and split or cracked containers.

Environmental damage can occur with either open or boxed packaging. Attributes of concern include rust, oil stains, water marks, salt films, and other stains or films. Also, included in this category is evidence of fire such as charred wood, paint or paper.

Attributes of the item itself which are of concern with respect to damage include those pertaining to integrity of extensions and members and surface condition. Broken, bent, deformed, cracked, or crushed areas are most likely on extensions, fragile members, and areas of perturbance from the general shape of the item. Attributes of surface condition include dents, gouges, scratches, and detrimental films or residues. Salts and other residues may be corrosive to the item. Oil and other contaminents may cause deterioration of function or simply require cleaning before use of the item. Some items, such as chemicals, can be rendered totally useless by environmental contamination.

Inspection Attributes for Identity and Quantity

Indentification of items is provided by either identification on the item or paperwork accompanying the item, or both. The extent of identification is dependent on the requirements of the purchase order for the item.

Identification on the item consists of either nameplates, markings, or tags. For materials, attributes of concern include type, condition, heat, and possibly size. *Type* refers to the specific alloy or compound. *Condition* refers to the

heat treatment and/or finished condition. *Heat* refers to the melt of metallic alloys. A similar term is *lot* which refers to a grouping by finished condition or by batching operations. For components and parts, attributes of concern include type, kind, and rating. *Type* refers to the general category of components such as valve, pump, pressure vessel, pipe, etc. *Kind* refers to the specific variety within the category such as gate valve, globe valve, check valve, etc. *Rating* refers to further characterization of the item which correlates it with the purchase order. For electrical items, ratings include such characteristics as power, voltage,
For mechanical items, ratings include such characteristics as pressure, head, flow, speed, etc.

Components and parts are frequently identified by a unique number as well as by the foregoing. Model number or part number uniquely identifies the type and kind. Such numbers are not to be confused with serial numbers or lot control markings. When serialization is required by procurement documents, each item of the same type and kind is also assigned a unique serial number. The serial number permits traceability from a given item to all records supporting the quality of the item. Lot control marking permits limited traceability to a period of time or to a specific batch relating to the manufacture of the item.

Paperwork which accompanies the item typically identifies the item and attests to its quality. The exact paperwork required to accompany the item is specified by procurement documents. When nothing is specified, suppliers merely provide their "shipper", or "shipping invoice". The *shipper* is a supplier document which identifies the supplier, the receiving address, and the item nomenclature and quantity. The shipping invoice is an unpriced copy of the supplier's invoice for payment which serves as the *shipper*. The shipping invoice provides the same information as the *shipper*. Neither of these documents attests to item quality.

Other accompanying documents which may be required by the purchase order are generally of these types: material test report, data reports, and certification of compliance. These documents both identify the item and attest to quality of the item. None of these documents are required unless specified by procurement documents.

Material test reports identify for each heat or lot the material properties of the item. The item's chemistry and mechanical strength are typically required to be reported. The report must identify the item represented and give actual values resulting from chemical analysis and mechanical tests. The format of the report is left to the supplier's discretion. An example material test report is illustrated in Figure 31-3-1. The example illustrates a report for nickel-chrome-iron tubing. The example report and the tubing it represents are correlated by the heat number and size.

Data reports provide results of inspections and tests performed by the supplier. Certain codes and standards specify the format of data reports. Otherwise the format of the data report is left to the discretion of the supplier. A sample data report for a six inch gate valve to the ASME Boiler and Pressure Vessel Code is illustrated in Figure 31-3-2. As indicated by the sample report, the data report is correlated to the valve by serial number.

Certificates of conformance are signed statements of compliance with procurement documents without any further supporting evidence. Such statements are signed by senior supplier management and certify that acceptable items are being supplied.

XYZ Company
Washington, D.C.

Item: 5/8" Tubing Condition: Hot-Finished- Annealed
Specification: ASTM SB-167 Heat: XL103B

Chemistry								
Element / Test	Ni	Cr	Fe	Mn	C	Cu	Si	S
Specified	72.0 min	14.0-17.0	6.0-10.0	1.0 max	0.15 max	0.5 max	0.5 max	0.015 max
Heat Analysis	74.5	15.5	8.0	0.8	0.05	0.05	0.2	0.005

Mechanical Properties			
Property / Test	Tensile	Yield	Elongation
Specified	80,000 min	30,000 min	35% min
Specimen #1	88,000	34,500	38%
Specimen #2	87,000	34,000	39%

Hydrostatic Test: 1500 Psig satisfactory

The items reported herein are certified as complete and accurate results of testing of the identified heat.

Figure 31-3-1. Sample Material Test Report

FORM NPV-1 N CERTIFICATE HOLDERS' DATA REPORT FOR NUCLEAR PUMPS OR VALVES*

As Required by the Provisions of the ASME Code, Section III, Div. 1

1 Manufactured by XYZ Co., Main Street, Anytown, USA
(Name and Address of N Certificate Holder)

2 Manufactured for ABC Power Company
(Name and Address of Purchaser or Owner)

3 Location of Installation ABC Power Company, Main Street, Anytown, USA
(Name and Address)

4 Pump or Valve Valve Nominal Inlet Size 6" (inch) Outlet Size 6" (inch)

	(a) Model No. Series No. or Type	(b) N Certificate Holder's Serial No	(c) Canadian Registration No	(d) Drawing No	(e) Class	(f) Nat'l Bd. No	(g) Year Built
1	5247 WE HF	C59301	N/A	A-9876-M-2B	1	500	1977
2							
3							
4							
5							
6							
7							
8							
9							
10							

5 Feedwater Isolation Valve
(Brief description of service for which equipment was designed)

6 Design Conditions 1785 psi (Pressure) 300 °F (Temperature) or Valve Pressure Class _____ (1)

7 Cold Working Pressure 2160 psi at 100 °F

8 Pressure Retaining Pieces

Mark No.	Material No.	Manufacturer	Remarks
(a) Castings			
Body A0389-1	SA-351, CF8M	XYZ Co.	Seal Welded Seats
Bonnet A0390-1	SA-351, CF8M	XYZ Co.	CoCrA Backseat
Wedge A0391-1	SA-351, CF8M	XYZ Co.	CoCrA Faced
Seat Ring A0392-1	SA-351,CF8M	XYZ Co.	CoCrA Faced
Seat Ring A0392-2	SA-351, CF8M	XYZ Co.	CoCrA Faced
Ret. Ring A489P	SA-216, WCB	XYZ Co.	
(b) Forgings			

(1) For manually operated valves only.

* Supplemental sheets in form of lists, sketches or drawings may be used provided (1) size is 8 1/2" x 11", (2) information in items 1, 2 and 5 on this Data Report is included on each sheet, and (3) each sheet is numbered and number of sheets is recorded at top of this form.

This form may be obtained from the Order Dept., 345 E. 47th St., New York, N.Y. 10017.

SAMPLE

Figure 31-3-2. Form NPV-1 Manufacturer's Data Report for Nuclear Pumps or Valves

FORM NPV 1 (Back)

Mark No.	Material Spec. No.	Manufacturer	Remarks
(c) Bolting			
(d) Other Parts			

(4) Hydrostatic test 3375 psi

CERTIFICATE OF COMPLIANCE

We certify that the statements made in this report are correct and that this pump or valve conforms to the rules of construction of the ASME Code for Nuclear Power Plant Components, Section III, Div. Edition 1974

Addenda N/A (Date) Code Case No. N/A Date 2/1/77

Signed XYZ Co. (Name of Certificate Holder)

Our ASME Certificate of Authorization No. N950 use the N symbol expires 1/6/78 (Date)

CERTIFICATION OF DESIGN

Design information on file at XYZ Co., Main Street, Anytown, USA

Stress analysis report (Class 1 only) on file N/A

Design specifications certified by (1) John Doe

PE State MD Reg. No. XXXX

Stress analysis certified by (1) N/A

PE State Reg. No.

(1) Signature not required. List name only.

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the State or Province of Pennsylvania and employed by The Hartford Steam Boiler I&I of Hartford, Conn.06102 have inspected the pump or valve described in this Data Report on 2/1 19 77 and state that to the best of my knowledge and belief, the N Certificate Holder has constructed this pump or valve in accordance with the ASME Code, Section III.

By signing this certificate, neither the inspector nor his employer makes any warranty, expressed or implied, concerning the equipment described in this Data Report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 2/1 19 77

John Doe (Inspector) Commissions National Board # XXXXX (Nat. Bd., State, Prov. and No.)

SAMPLE

Figure 31-3-2. Form NPV-1 Manufacturer's Data Report for Nuclear Pumps or Valves (cont.)

Inspection Attributes for Item Function

The function of items cannot easily be determined at receiving. To truly check function of items, test apparatus would have to simulate the operating parameters and environment and measure the item's performance under such conditions. Such testing is rarely done at receiving. Instead, receiving inspection determines if evidence of deterioration of functionability exists. Such evidence typically consists of physical damage, lack of cleanness, missing parts, and insufficient fluids such as lubricating oil. Attributes pertaining to damage were previously described.

Cleanness of items includes the attributes of rust, scale, films, dirt, oil, grease, chips, and any other foreign matter prohibited or limited by procurement documents. The acceptance criteria for cleanness are given by procurement documents as either prohibition or limitations. Loose foreign materials are typically prohibited in the internals of the item. Oxides are typically limited although they may be prohibited for certain specialized items. An example of a limitation is "only tightly adherent oxide films which are not removed by hand wire brushing". Cleanness of the item can interfere with the function of the item and is, therefore, typically checked at receiving.

The missing parts category includes a wide variety of possibilities. Experience indicates that most frequent occurrence of missing parts pertains to (1) unassembled parts which are required to accompany the partially assembled item and (2) hardware associated with fasteners in the assembled item. Some items are delivered as partial assemblies with attached parts necessary to complete the assembly. Also, sometimes parts needed at installation of the item into a system are required to be attached to the item. Accompanying parts typically fall into the categories of

fasteners, mounts, couplings, connectors, brackets, cabling, hoses, covers, and safety guards. Hardware associated with fasteners in the assembled item include bolts, screens, flat washers, lock washers, nuts, and locking devices such as lock wires, lock tabs, and lock cups. While experience indicates that the foregoing are most frequent culprits, the concept of missing parts actually includes anything required by procurement documents which does not exist in or with the received item.

Procurement documents may require items to be filled or coated with specified fluids. Examples of operating fluids attributes include grease cups, grease fittings, and oil reservoirs. Protective coatings include oil, grease, paint, and gas blankets such as nitrogen. Whenever required by procurement documents, attributes pertaining to fluids and coatings are made subject to receiving inspection.

RECEIVING INSPECTION PRACTICES

Levels of Inspection

The extent of inspection performed at receiving is dependent on the importance of the item to plant operation and whether inspection was performed by representatives of the purchaser at the source of fabrication of the item. Dependent on these factors, various levels or degrees of inspection are established by the QA Department. The exact inspection levels used vary somewhat among purchasers. Nonetheless, four basic levels are typically used. These are (1) visual examination for identity and lack of damage, (2) record review of supplier reports, (3) visual examination for item conformance with procurement documents, and (4) inspection of specified product attributes.

Visual examination for identity and lack of damage is typically performed by the Material Services Department for all items upon their receipt. Where possible, this examination is performed prior to off-loading of items in order to avoid accepting custody of items if they are damaged or of incorrect kind. Material Services receiving technicians examine for identity by comparing purchase order requirements with the identification on the item evidenced by nameplate, marking, labels, or tags. The technician verifies that the type, kind, rating, and quantity agree with procurement documents. The technician examines for damage by visually inspecting the packaging and, for unsealed items, inspecting the item. Where evidence of potential damage exists, the technician is typically required to notify a QC inspector who then performs a thorough examination. Deficiencies found in identity are also reported to the QC inspector who documents the deficiencies.

Record review of supplier documents is typically performed by the QC inspector. The Materials Services technician checks for the existence of supplier documentation as part of the identity checks. If required documentation is not with the item, the technician notifies the QC inspector who documents the deficiency. The technician forwards the supplier documents to the QC inspector for review. The inspector compares requirements of procurement documents against the vendor reported data.

Visual examination for conformance of items with procurement documents is typically performed by the QC inspector and only for designated items. Those items most important to safe plant operation are designated as requiring this inspection. Such designation is typiclaly by a "Q" list which identifies all items which will be received and

whether inspection for conformance applies. For such items, the QC inspector compares drawing requirements with the item to determine compliance. Such visual examination determines if the item "looks like" the drawing. Checks include orientation, size, shape envelope, surface condition, cleanness, existence of features such as bolt holes, slots and keyways, and lack of damage. Sealed items are typically unsealed to permit this inspection and then resealed. An exception is where exposure to atmosphere must be avoided. In such cases, inspection is performed visually through the sealing material if transparent or delayed until installation if opaque.

Inspection of specified product attributes is typically performed by the QC inspector and only for designated items. Product attributes made subject to this inspection are typically those which interface with other items at installation. Examples include weld end preparations, flange faces and holes, threaded connections, seating surfaces, and electrical characteristics, functions and connections. For these attributes, the QC inspector uses appropriate measuring and test equipment to inspect the item. Such measuring devices must be calibrated. Items made subject to this level of inspection are typically only those of great importance to safe plant operation.

Receiving Inspection Records

Receiving inspection begins with receipt of items and ends with release of accepted items to stores or identification of nonconforming items for disposition. As previously described, the Material Services technician receipt inspects everything for identification and lack of damage. For nonconforming items and for items requiring QC inspection, the technician notifies the QC inspector. Upon being notified, the QC Inspector verifies nonconformance and/or

performs additional planned inspections. Thus, records are usually generated by the receiving technician or by the inspector for those items requiring QC inspection.

The Material Services technician typically records his/her inspection results either on a copy of the purchase order or on the supplier's shipper. Where a copy of the purchase order is used, a preprinted section is often provided across the bottom of the purchase order form. This section requires entries of (1) quantity ordered, (2) quantity received, (3) quantity accepted, and (4) date of receipt. Where preprinted sections are not provided and where shippers serve as the record, an ink stamp is often used to stamp the document with a single format which requires the same four entries. The completed record is typically forwarded to Purchasing Department as evidence that payment to the supplier can be initiated. A separate stock inventory record is typically prepared to identify that items are available for use as needed. During the Construction Phase, a copy of the stock inventory record is typically forwarded to the Planning Section responsible for scheduling construction activities. During the Operations Phase, the stock inventory record is used by Material Services to maintain status of inventory levels.

For items subject to QC inspection, a QC inspection report is also generated. A sample QC inspection report is illustrated in Figure 31-3-3. This sample report is based on the QC inspector determining the exact attributes to be inspected using the form as a guide. For each attribute on the form, the inspector determines from the procurement document if specific requirements apply. Where specific requirements are specified, the inspector examines corresponding attributes. Otherwise, the attributes on the form are marked N.A. (not applicable). Other types of forms are used in conjunction with receiving inspection procedures

which specify exactly what is to be inspected. A third type is a form where an engineer enters the attributes to be inspected and the inspector enters the inspection results. All such forms provide space for recording (1) item identity, (2) attributes inspected, (3) acceptance of the item and (4) nonconformance report number for rejected items.

Items accepted by receiving inspection are typically tagged to positively identify the acceptance status. Green tags are often used of a format similar to that in Figure 31-3-4. The tag is physically attached to the item and not removed until installation of the item into its system.

Items rejected by receiving inspection must be identified as nonconforming to prevent their inadvertant use. Typically, red tags are used of a format similar to that illustrated in Figure 31-3-5. The tag is physically attached to the item and not removed until disposition of the nonconformance. The disposition may be (1) accept-as-is, (2) repair, (3) rework, or (4) replace dependent on the specific nonconformance.

Red tags are removed (after disposition) only by the originator or by the QA inspector.

BEST COPY AVAILABLE

QUALITY CONTROL RECEIVING INSPECTION REPORT

DATE OF Q.C. INSPECTION

SYSTEM NO./NAME	PURCHASE ORDER NO. DATE
COMPONENT/PART NO.	VENDOR
SERIAL NO./MODEL NO.	SPECIFICATION NO.
HEAT NO./LOT NO.	
DWG. NO./PART NO.	CODE CLASS

Assigned Storage Level
A. Special Environment
B. Inside Heated
C. INSIDE
D. OUTSIDE

Nonconformity Report No. _____

Disposition Accept _____
Hold _____ Tag # _____
Reject _____ Tag # _____

DWG. NO. OR P.O.	ITEM	QTY.	DESCRIPTION(S) AND INSPECTION REMARK(S)				
			ITEM INSPECTION	SAT.	UN-SAT.	N.A.	REMARKS
			Identification and Marking				
			Manufacturing Documentation				
			Protective Covers and Seals				
			Coatings and Preservatives				
			Insulation Blankets				
			[illegible]				
			[illegible]				
			[illegible]				
			SOURCE INSP. [illegible] YES NO				
			[illegible] Performing Following Insp.				
			Physical Properties				
			Dimensions				
			Weld Preparation				
			Workmanship				
			Lubricants and Oil				
			Electrical Insulation				
			Special Inspection				

SPECIAL INSPECTION RECORDS 1-RECORDS REQ'D 0-RECORDS NOT REQ'D	MT	PT	RT	UT	VIS.	CHEM	PHYS	SPOT CHECK	DIM

RELEASED FOR [illegible] VALUATION YES NO

Q.C. INSPECTOR	DATE	PAGE OF

Figure 31-3-3. Sample QC Receiving Inspection Record

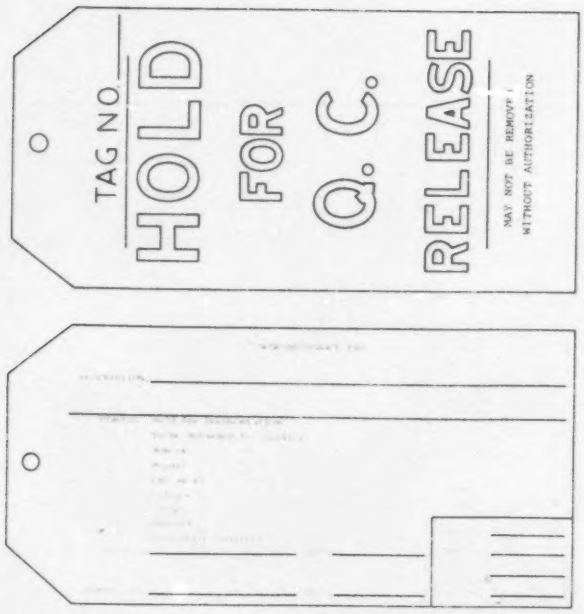

Figure 31-3-5. Example Nonconformance Tag (Typically Red)

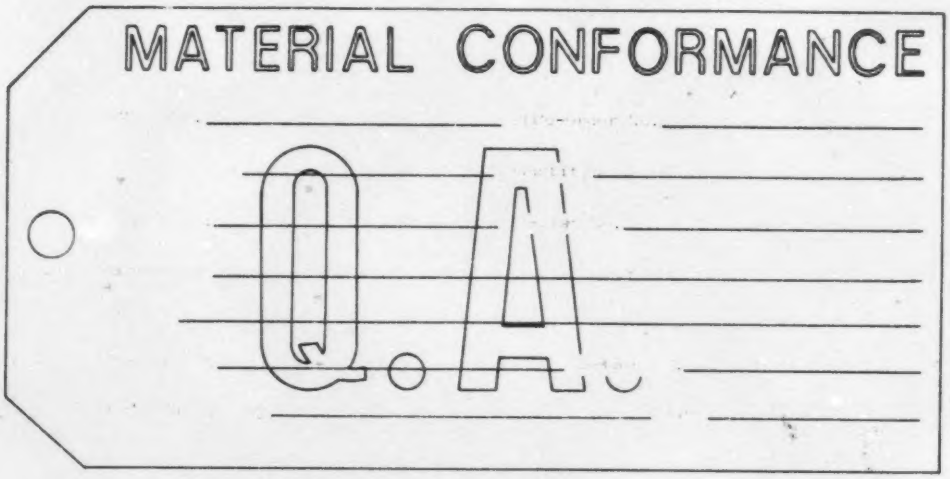

Figure 31-3-4. Sample Acceptance Tag (Typically Green)

HANDLING DURING RECEIVING INSPECTION

General

Handling requirements are specified to minimize the possibility of damaging items during positioning and transporting of items. The extent of handling requirements depends on the specific item and the equipment necessary to position or transport the item. QC receiving inspection must use proper handling techniques during inspections and are sometimes responsible for observing the handling practices of others for compliance to requirements.

Detailed handling instructions are prepared for those components which require special handling because of weight, size, susceptibility to shock damage, high nil ductility transition temperatures, or any other conditions that warrant special instructions. These instructions are made available to the inspector prior to the time the component is to be handled. The procedure indicates the weights, sling locations, balance points, methods of attachment, maximum hoist line speeds, and any other pertinent features to be considered as necessary for safe handling.

Hoisting equipment used for handling components are certified by the manufacturer. The certification indicates the various parameters for the maximum load to be handled by the equipment. Hoisting equipment must not be loaded beyond its rated load, as certified by the manufacturer, except for test purposes. For special lifts, hoisting equipment may be re-rated, or modified and re-rated, upon approval by the manufacturer. If the manufacturer's specifications are not available, the limitations assigned to the equipment must be based on the determinations of a qualified engineer competent in this field. This determination must be documented and recorded appropriately.

Re-rated equipment must be given a dynamic load test over the full range of lift using a test weight at least equal to 110% of the lift weight. A dynamic test includes raising, lowering, and traversing the load in contrast to a static test where the test weight may be increased incrementally with no movement.

During handling activities, the inspector typically verifies the following:

- Rigging is not frayed, worn or otherwise deteriorated.
- Hoisting equipment ratings are equal to or greater than the load.
- Equipment and rigging is clean and free of contaminants that are detrimental to the item being handled.
- Rigging items such as hooks, shackles and turn buckles have not yielded, distorted, or deformed.
- Load measuring devices such as strain gages or pressure gages are used when specified.
- Rapid movement or jerking is avoided.
- Lifting lugs or other appropriate loading surfaces on the item are used.
- Ample space exists for the movement or transporting.

EXERCISES

The following exercises serve to reinforce the information presented in this module.

1. Complete Table 31-3-1 given in the Data Table section of this module by filling in the typical attributes of *shipping damage, identity and function.* Use the information presented in this module as guidance.

2. Name and briefly describe the four levels of receiving inspection by completing Table 31-3-2 in the Data Table section of this module. Use the information on the Levels of Receiving Inspection presented in this module for guidance.

3. Review a sample material test report against the corresponding material specification. Document your results as outlined in the Procedures section of this module.

4. Review a receiving inspection record and prepare a narrative report on strengths and weaknesses of the record. Consider item identification, inspection attributes, acceptability, and nonconformance.

5. Inspect a packaged item supplied by the inspector. Prepare a record similar to that illustrated in Figure 31-3-3 of this module and document results thereon.

6. Inspect a defective item, i.e. one not in compliance with the purchasing requirements, and prepare a Quality Control Receiving Inspection Report, proper tag and Nonconformance form.

MATERIALS

The following materials are required to support this module:

- Receiving inspection procedures for packaged items.
- Sample material test report and corresponding material specifications.
- Sample receiving inspection records.

PROCEDURES

1. Review a sample material test report against the corresponding material specifications as requested in exercise 3 of this module.

   Using Table 31-3-3 given in the Data Table section of this module, list the following:

   a. Chemical Analysis:
      (1) Required Chemical Specifications
      (2) Actual Chemical Analysis

   b. Mechanical Properties:
      (1) Type of Mechanical Test performed
      (2) The required value for the test performed
      (3) The reported value for the test performed

DATA TABLE

1. Table 31-3-1 refers to exercise 1 of this module.

Table 31-3-1
Receiving Inspection Attributes

Applicable To	Typical Attributes
Shipping Damage	
Identity	
Function	

2. Table 31-3-2 refers to exercise 2 of this module.

Table 31-3-2
Levels of Receiving Inspection

Level Title	Description
1.	
2.	
3.	
4.	

3. Table 31-3-3 refers to exercise 3 of this module.

Table 31-3-3

Review of Material Test Report

Specification: _____

Item Identity: Type _____ Size _____

Model _____ Serial _____

Heat or Lot _____

Chemistry:

Element / Test								
Required Value								
Reported Value								

Mechanical Properties:

Type Test	Required Value	Reported Value

REFERENCE MATERIALS

Juran, J.M., Quality Control Handbook, 1974, McGraw-Hill, Inc.

ASME, Quality Assurance Program Requirements for Nuclear Power Plants, ANSI N45.2, The American Society of Mechanical Engineers

ASME, Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants, ANSI N45.2.13, The American Society of Mechanical Engineers

ASME, Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants, ANSI N45.2.2, The American Society of Mechanical Engineers

ANS, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants, ANS 3.2/ANSI 18.7, American Nuclear Society

TEST

1. Name three functions typically accomplished by the receiving activity.
   a.

   b.

   c.

2. Describe the relative responsibilities for the receiving activity of Material Services Department, Quality Assurance Department, and Quality Control Department.
   a. Material Services

   b. Quality Assurance

   c. Quality Control

3. A thirty-six inch motor operated gate valve is received which is strapped to a shipping pallet. Describe inspection for shipping damage including attributes associated with this inspection.

4. A dozen relays are received with each in a cardboard box and the twelve boxes in a larger cardboard box. The large box has oil stains across the bottom and one upper corner is crushed. Describe inspection for shipping damage.

5. Describe receiving inspection for identity including typical attributes associated with this inspection.

6. Name two types of paperwork which may accompany received items and which attests to quality of the items.

7. For each of the documents named in question #6, describe the general content of the document.

8. Describe receiving inspection of items for functionability of the item including typical attributes associated with this inspection.

9. Name three levels of receiving inspection and briefly describe each.

10. Describe the uses of:

a. QC Receiving Inspection Report

b. Conformance Tag

c. Nonconformance Tag